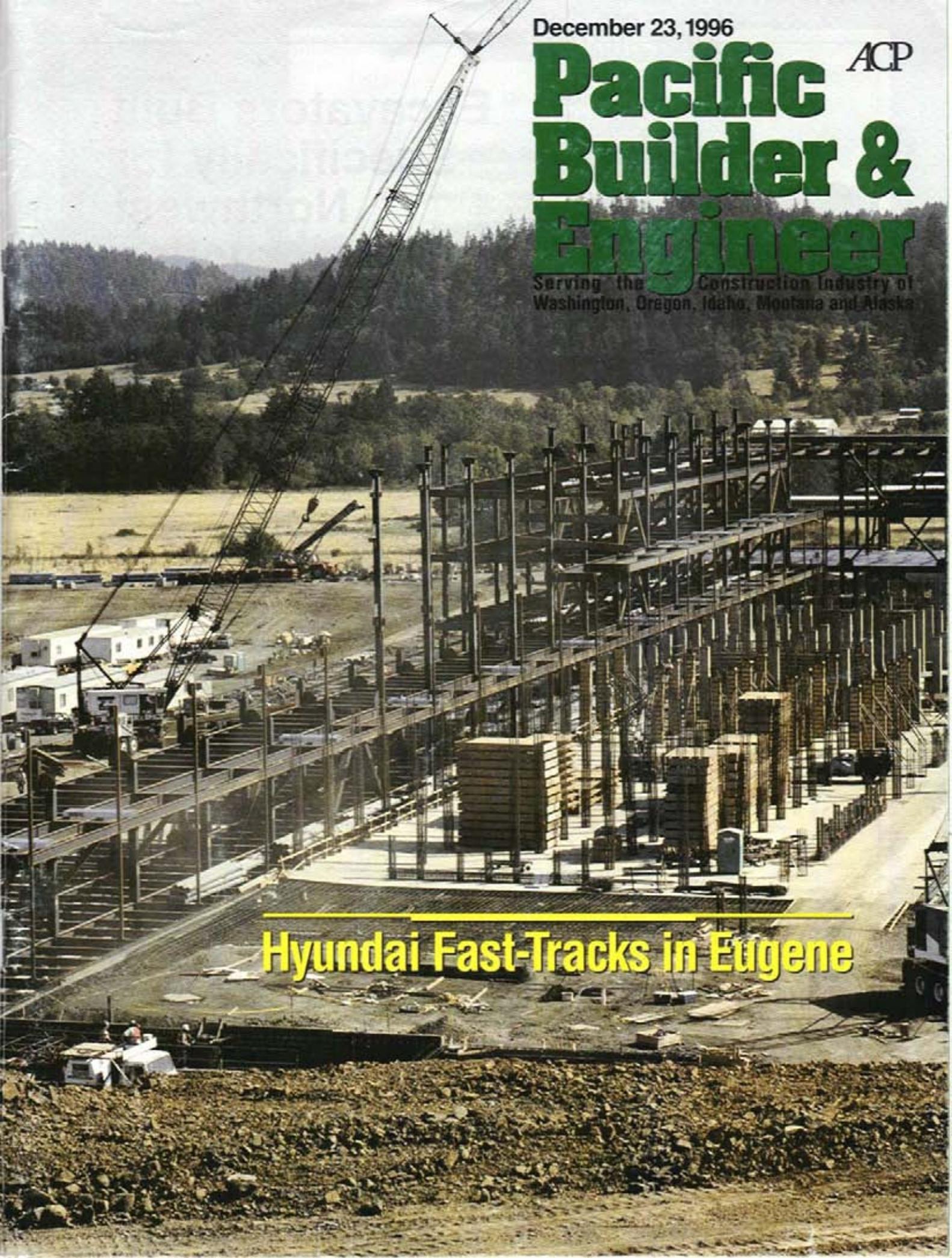


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**Hyundai Fast-Tracks in Eugene**

# Hyundai Semiconductor project in Oregon faces need for speed

**First phase alone putting 1 million sq. ft. under roof**

By Carl Molesworth

If ever a construction job was ideally located for "sidewalk superintendents," it's the Hyundai Semiconductor America project in the Willow Creek Industrial Park on the west side of Eugene, Ore.

Ever since construction began at Hyundai a year ago, cars and trucks have been making their way up to the turnaround on the Pitchford Avenue hill in a steady trickle. There, curious onlookers have a perfect view down into the project without disrupting the work going on below them. Many use field glasses to get a closer look; others shoot photographs. Few, if any, come away unimpressed.

Well they should be impressed. Hyundai is spending \$1.3 billion on the project, building nearly a million sq. ft. of floor space under three roofs. And this is only the first of three possible phases. Even so, it's the largest private investment ever made in Eugene, one that will create the city's third-largest employer when the plant opens for production next fall.

It also should be obvious to the observers on Pitchford Avenue that the project is moving forward at great speed. That, too, is to be expected when you consider that the plant will be capable of manufacturing \$6.7 million worth of computer microchips per day.



The roof trusses are installed on the 745,000 sq. ft. Fab I manufacturing building at the Hyundai Semiconductor America project in Eugene, Ore. Photo by Dan Steinberg.

In other words, the sooner the plant is up and running, the sooner Hyundai can begin selling all those chips. Richard Latenser, construction manager for Hyundai, isn't kidding when he calls this a fast-track project.

## Excavation included blasting

Fab I, as Hyundai calls the first phase project at Eugene, consists of the three-story, 745,000-sq.-ft. manufacturing building; a 115,000-sq.-ft. central administration building and a 110,000-sq.-ft. central utility building. A joint venture of Meissner & Wurst and Marshall Contractors Inc. is serving as general contractor.

Hyundai originally announced plans

to build the plant in May 1995. Following a contentious permitting process involving legal challenges by environmental groups, the company obtained a key wetlands fill permit from the U.S. Army Corps of Engineers in late December 1995. This permit allowed the company to fill 10.4 acres of wetlands on the 204-acre site. Ground was broken a few days before Christmas 1995. Eugene Sand & Gravel conducted the preliminary site work, including installation of a sediment pond and erosion controls on eight acres.

At the end of January 1996, Hyundai obtained a permit from the City of Eugene for major site work valued at \$5.85 million. Kiewit Pacific was chosen as the main excavation contractor in February, and work soon began around the clock building roads, establishing stockpile areas and completing excavation for Fab I. The massive excavation took seven months to complete. It included blasting to remove granite from the hillside below Pitchford Avenue, then crushing and stockpiling the material for use later in the project.

By mid-summer, there were about 200 workers on the site, and observers on the hill were beginning to see the shape of things to come. Utility lines and a grounding grid for the electrical system were laid, and the massive concrete footings for the manufacturing and utility buildings were poured. Structural steel began arriving on the site, and the erection contractor, Midwest Steel, joined the action.



A Caterpillar 225B LC excavator of Kiewit Pacific Co. works near the retention ponds on the Hyundai Semiconductor America site in Eugene, Ore. Photo by Carl Molesworth.

## Busy construction site

When PB&E visited the project in late August, construction equipment was everywhere. Three lattice-boom mobile cranes were at work placing steel, and a Link-Belt truck-mounted telescoping crane was unloading girders from delivery trucks. Meanwhile, two concrete pumps were being used to pour the slab for the manufacturing building, and numerous forklifts and manlifts were in use around the structures. Perhaps two dozen machines involved in the site work — including dozers, loaders, excavators, scrapers and articulated dump trucks — were in operation on the property as well.

The main buildings were roofed and enclosed during the fall of this year. According to a fact sheet provided by Hyundai, materials used for construction of Fab I include about 68,000 cu. yd. of concrete, which would be enough to cover a four-lane highway for 5.5 miles, and some 5,700 tons of structural steel. The roof area of the manufacturing building measures approximately 285,000 sq. ft.

Next came the big challenge of doing fill-in work, which includes installation of flooring, interior walls, and the sophisticated plumbing and electrical systems.

With the onsite work force growing from about 300 to more than 1,200, scheduling and coordination have taken on even greater importance than before. Not only do the various trades need to be able to work among each other, but they must have tools and materials at hand when they need them.

The fill-in work is scheduled to last into next spring and will include "tons of welding," Latenser said.

### Building clean rooms

The utility building, which will house the mechanical systems for the manufacturing process and is called the "Cub," and the administration building are both substantial structures. But the manufacturing building is by far the most complex aspect of Fab I because of the extreme cleanliness required for the successful production of computer chips. Even the tiniest of dust particles or flakes of human skin floating in the air can contaminate a microscopic chip circuit.

The manufacturing building was designed to have three levels above ground, Latenser said. The challenge for Meissner & Wurst's designers was to create a system that would circulate air through building's the "clean rooms" and filters, yet do it in such a way that moving air would not disrupt the manufacturing process.

To accomplish this goal, said Latenser, the cleanest of the clean rooms was placed on the top floor of the building. Production workers in this room will be breathing air



The Hyundai Semiconductor America project consumed 5,700 tons of structural steel in three buildings. Photo by Carl Molesworth.

10 times cleaner than they would encounter in the cleanest hospital operating rooms in America. The air-filtration system starts in the ceiling, where fans blow air down into the top floor clean room. Supporting the raised and perforated floor of this room is a 3-in.-thick waffle slab that allows the air to then pass through it to another clean room below on the second floor.

From the lower clean room, the air is circulated back up to the ceiling of the top-floor clean room, passing through micron-based hepafilters to remove any foreign matter, Latenser said.

The bottom floor of the manufacturing building will contain the infrastructure for the building, including pumps, power supplies and vacuum systems. Utility lines, carrying the chemicals, gases and water used in making microchips, will connect the manufacturing building to the Cub by means of a tunnel. From basement chases, the lines will feed into the clean rooms of the building.

The attention to cleanliness doesn't just start when the plant goes into production, however. Extra care is required during each stage of construction to ensure that sterility isn't compromised. This includes the installation of various components such as piping for the water and chemical systems. During the final stages of finishing in the clean rooms, construction workers will be required to wear sterile suits like the ones that manufacturing personnel will wear during production.

### Project on schedule

Hyundai America's development plans drew quite a bit of attention from the Eugene area's environmental community when they were announced, but the project has encountered few problems since construction started. The State of Oregon leveled three fines against the company for allowing sediment into water running off the site during periods of heavy rain, and the City of Eugene hesitated to renew the

permit allowing around-the-clock operations because of complaints from neighbors about noise from the backup alarms on the construction vehicles being operated on the site. Also, unions staged two days of work stoppages and one slowdown during September to protest the hiring of a non-union subcontractor. These situations have been resolved (or are being addressed at the time of this writing) and have not significantly slowed the project.

Considering the complexity and large scope of this project, Latenser is satisfied with the progress being made on Fab I.

"We've had a little slip here, an add there, but essentially we're on schedule," he said during an interview last August. He also mentioned that the safety record on the site was good.

The biggest challenge in managing a design/build project such as this one, Latenser said, is "making sure the design stays in front of the build."

Hyundai's schedule calls for installation of the sophisticated (and expensive) manufacturing equipment to begin in April 1997. The project is to be completed in August, with production to start in September following a test period.

The schedules for the second and third phases of the Hyundai plant construction are not as clear. Most of the permits have been obtained for Fab II, which will add a second manufacturing building and Cub next to the structures under construction now, Latenser said, but no startup dates have been announced.

Fab III originally was conceived as the largest of the three, with construction slated to begin in 2002. Latenser described this last project as being a "conceptual desire" of the company, however, with no firm plans in place for building it.

Still, it appears likely that Hyundai will be giving the sidewalk superintendents on Pitchford Avenue hill plenty more construction to watch in the years to come. ■